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Shinji Yamamoto

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WASHINGTON, DC 20005

EXAMINER

CRAIG, DWIN M

ART UNIT

PAPER NUMBER

2123

NOTIFICATION DATE

DELIVERY MODE

06/27/2011

ELECTRONIC

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PTO-PAT-Email@rfem.com

<b>Office Action Summary</b>	<b>Application No.</b> 10/589,919	<b>Applicant(s)</b> YAMAMOTO ET AL.	
	<b>Examiner</b> DWIN M. CRAIG	<b>Art Unit</b> 2123	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 10 May 2011.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-12 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

### **DETAILED ACTION**

1. Claims 1-12 have been presented for reconsideration based on Applicants' amended claim language and arguments.

#### ***Response to Arguments***

2. Applicants' arguments presented in the May 10<sup>th</sup> 2011 response have been fully considered; the Examiner's response is as follows:

2.1 Applicants' argued that neither *Ziakovic* nor *Barraf* expressly teach or make obvious the newly presented claimed limitation, wherein "providing the knit garment being a virtual knit garment and having a plurality of connected parts and being fully assembled;" and the portions of the virtual garment having "already connected" parts.

The Examiner respectfully traverses Applicants' arguments, *Barraf* expressly teaches on page 9 in the section entitled, "8 Results" the following;

*"The clothes in figures 3-6 were modeled as discrete panels, and then topologically seamed. The simulator was used to relax the clothing from an initial deformed state, that got the clothes around the characters, to a well-fitting state on the characters..."*

Clearly this disclosure in *Barraf* teaches that a virtual garment was *topologically seamed* which is the same as *fully assembled* before being placed on the virtual human shapes.

It is for these reasons that the currently amended claims will be rejected.

#### ***Specification***

3. The disclosure is objected to because of the following informalities: on page 8 of the specification the word "symbols" is misspelled.

Art Unit: 2123

Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 1-12 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Applicants' specification fails to provide written description support for describing that the claimed *virtual knit garment* was *fully assembled* or that the parts of the *virtual knit garment* were *already connected*. Applicants' specification is *silent* as to the written description of the phrase(s), *fully assembled* or *already connected*.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Art Unit: 2123

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 1, 2, 4, 5, 6, 8, 9, 10 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 6,968,297 to Ziakovic et al. in view of “Large Steps in Cloth Simulation” hereafter referred to as Baraff et al. and in further view of U.S. Patent 6,310,627 to Sakaguchi.

5.1 As regards independent claims 1, 5 and 9 and using claim 1 as an example, *Ziakovic* teaches, *a method for simulating wearing of a knit garment on a human model, the knit garment being a virtual knit garment and having a plurality of parts*, (see Figures 1-9A and as regards a teaching of a *virtual dummy* see Col. 2 lines 38-43, more specifically “...The invention provides

Art Unit: 2123

a method of viewing a garment made up of garment pieces on a virtual dummy...” a virtual dummy is the same as a *human model*) *the human model being a three-dimensional human model and comprising a plurality of polygons* (see Figure 16 and Col. 6 lines 44-48 more specifically, “the surface resulting from the accumulation of convex polygons...”), *the method comprising the steps of: providing the human model with a plurality of axes* (Figure 8 and the descriptive text); *matching each of the parts of the knit garment with any of the plurality of axes* (see Col. 4 lines 1-3, placing is functionally the same as matching, see also Col. 7 lines 6-12 not the discussion regarding *point-to-point relationship between the surface of the dummy and the piece of fabric*) *and temporarily positioning the knit garment with respect to the human model; and shrinking/expanding the temporarily positioned knit garment toward the axis matched with each of the parts of the knit garment in a peripheral direction to obtain a natural size of each of the parts, whereby the knit garment is worn on the human model so that each of the parts appears outside the human model* (see the discussion of deformation and fitting of the knit garment to the model in Col. 9-14), and “expanding the connected parts of the knit garment to form connected tubular parts of the knit garment, Ziakovic teaches Col. 1 lines 27-35;

“In a known method shown in FIG. 1, garment pieces 2, 4, 6 to be assembled together are placed approximately facing their final positions around a dummy 8. Then, the seam lines are connected together by pieces of “elastic” 10, 12, 14, 16, 18, 20, 22. The fabric is then simulated under conditions of “weightlessness”. The pieces converge on one another and finally become stable edge-to-edge. It then remains merely to sew them together.”

Thus Ziakovic does expressly teach connected portions of virtual fabric. Further, Ziakovic goes on to teach, Col. 12 lines 4-8 repeated here;

Art Unit: 2123

“Subdividing the portion of garment (or the corresponding data) to be processed may consist in isolating connected zones that are substantially compressed or stretched. Arbitrarily-connected subdivision is equally effective, but suffers from a slight loss of performance.”

And, Col. 10 lines 14-11 describes “...sewn edges are *merged*...” which teaches again portions of the garment being connected.

However, *Ziakovic* does not expressly disclose, *shrinking and expanding the knit garment toward matched axes so that a portion of the garment contacts the human model*. As well as to the newly amended limitation; providing the knit garment being a virtual knit garment and having a plurality of connected parts and being fully assembled.

*Baraff* teaches, *shrinking and expanding the knit garment toward matched axes so that a portion of the garment contacts the human model*, see Figure 3 through Figure 7 as well as the discussion regards detecting collisions presented on pages 4 & 5 regarding stretch forces;

## 4.2 Stretch Forces

Recall that every cloth particle has a changing position  $\mathbf{x}_i$  in world space, and a fixed plane coordinate  $(u_i, v_i)$ . Even though our cloth is modeled as a discrete set of points, grouped into triangles, it will be convenient to pretend momentarily that we have a single continuous function  $\mathbf{w}(u, v)$  that maps from plane coordinates to world space. Stretch can be measured at any point in the cloth surface by examining the derivatives  $\mathbf{w}_u = \partial \mathbf{w} / \partial u$  and  $\mathbf{w}_v = \partial \mathbf{w} / \partial v$  at that point. The magnitude of  $\mathbf{w}_u$  describes the stretch or compression in the  $u$  direction; the material is unstretched wherever  $\|\mathbf{w}_u\| = 1$ . Stretch in the

Art Unit: 2123

$v$  direction is measured by  $\|\mathbf{w}_u\|$ . (Some previous continuum formulations have modeled stretch energy along an axis as essentially  $(\mathbf{w}_u^T \mathbf{w}_u - 1)^2$ , which is a quartic function of position [15, 16, 17, 4]. We find this to be needlessly stiff; worse, near the rest state, the force gradient—a quadratic function of position—is quite small, which partially negates the advantage implicit integration has in exploiting knowledge of the force gradient. A quadratic model for energy is, numerically, a better choice.)

And also see the discussion regards other forces on page 5;

## 4.4 Additional Forces

To the above forces we also add easily implemented forces such as gravity and air-drag (which is formulated on a per-triangle basis, and opposes velocities along the triangle's normal direction). When the simulation is fast enough to interact with, we add user-controlled “mouse” forces. These forces and their gradients are easily derived.

See also the discussion regarding constraints on page 6.



## 5 Constraints

In this section, we describe how constraints are imposed on individual cloth particles. The constraints we discuss in this section are either automatically determined by the user (such as geometric attachment constraints on a particle) or are contact constraints (generated by the system) between a solid object and a particle. The techniques we describe in this section could be used for multi-particle constraints; however, constraints that share particle would need to be merged. Thus, a set of four-particle constraints (such as vertex/triangle or edge/edge contacts in the cloth) might merge to form a single constraint on arbitrarily many particles, which would be expensive to maintain. Because of this, we handle cloth/cloth contacts with strong springs (easily dealt with, given the simulator's underlying implicit integration base) and "position alteration," a technique described in section 6.

At any given step of the simulation, a cloth particle is either completely unconstrained (though subject to forces), or the particle may be constrained in either one, two or three dimensions. Given the differential nature of our formulation, it is the particle's acceleration, or equivalently, the change in the particle's velocity, that is constrained. If the particle is constrained in all three dimensions, then we are explicitly setting the particle's velocity (at the next step). If the constraint is in two or one dimensions, we are constraining the particle's velocity along either two or one mutually orthogonal axes. Before describing our constraint method, we discuss several other possible enforcement mechanisms and explain why we chose not to use them.

Baraff further teaches, on page 9 in the section entitled, "8 Results" the following;

*"The clothes in figures 3-6 were modeled as discrete panels, and then topologically seamed. The simulator was used to relax the clothing from an initial deformed state, that got the clothes around the characters, to a well-fitting state on the characters..."*

Clearly this disclosure in Baraff teaches that a virtual garment was *topologically seamed* which is the same as *fully assembled* before being placed on the virtual human shapes.

Art Unit: 2123

Further *Sakaguchi* also teaches, Col. 17 lines 54-67 as well as Col. 18 lines 1-10 which describes a virtual garment that is fully assembled, see also Figure 5 item 801 and Figure 6 item S2 and all of Figure 7.

*Ziakovic*, *Baraff* and *Sakaguchi* are analogous art because they both come from the same problem solving area of simulating virtual garments.

At the time of the invention, it would have been obvious, to an a person of ordinary skill in the art to have used the teachings of *tubular knit garments with a portion of the garment having contact with a human model* with the teachings of modeling a knit garment that was fully assembled.

The motivation for doing so would have been, to have a faster simulation which uses a lower amount of processing resources, see page 1 of *Baraff et al.*

The motivation for using the teachings of *Sakaguchi* would have been to reduce the time labor and cost of generating images of people wearing garments, see Col. 1 lines 22-35 of *Sakaguchi*.

Therefore, it would have been obvious to combine the teachings of *Baraff et al.* and *Sakaguchi* with the teachings of *Ziakovic* in order to obtain the invention as specified in claims 1, 2, 4, 5, 6, 8, 9, 10 and 12.

**5.2** As regards claims 2, 6 and 10 and using claim 2 as an example, *Ziakovic* discloses wherein: the human model comprises at least a torso and both arms, along with an axis of the torso, and axes of the right and left arms; the plurality of parts of the virtual knit garment comprises at least a body and sleeves, each of the parts is matched with any of the axes of the

Art Unit: 2123

*human model, and the temporal positioning is performed so that the axis matched with each of the parts passes through the inside of each of the parts; and both of the sleeves of the virtual garment are shrunk/expanded such that upper parts of the both sleeves contact with upper parts of the arms of the human model and spaces are provided at lower parts of the both sleeves with respect to the upper parts of the arms of the human model. (see the discussion of deformation and fitting of the knit garment to the model in Col. 9-14 and Figures 3-18 and the descriptive text).*

**5.3** As regards claims 4, 8 and 12 and using claim 4 as an example, , *Ziakovic* discloses *wherein after wearing the knit garment, each of stitches of the knit garment is moved close to a mean position of surrounding stitches, whereby positions of the stitches of the knit garment are smoothed, and the smoothing is repeatedly performed.* (see the discussion of deformation and fitting of the knit garment to the model in Col. 9-14 and Figures 3-18 and the descriptive text).

**6.** Claims 3 and 7 are rejected under 35 U.S.C. 103(a) unpatentable over *Ziakovic et al.* in view of *Barraf et al.* and in further view of *Sakaguchi*

**6.1** As regards claims 1 and 2, from which claim 3 depends and claims 5 and 6 from which claim 7 depends, see above.

**6.2** OFFICIAL NOTICE

As regards claims 3 and 7, having a stitch on a virtual or actual garment be arranged or re-arranged along the *course or whale* direction is well known in the garment art.

For example U.S. Patent 4,306,429 teaches stitch wales in bonded fabrics.

Art Unit: 2123

Claim interpretation, the disclosed teachings of Ziakovic teaches that a deformation function is optimized, see Figure 14 item S342 and Col. 14 lines 55-60 more specifically, “The garment can then be relaxed (step S34). Then comes the mechanical simulation step (S38) which makes it possible, for a given fabric, to find the correct drape for it, and which makes it possible to remove any remaining *deformations*. Is being interpreted to mean the same as the claimed *distortions* as expressly claimed in Applicants’ instant claims.

At the time of the invention, it would have been obvious, to an artisan of ordinary skill in the art to have had a model of a tubular element in a virtual knit garment to be rearranged along the course or wale direction.

### ***Conclusion***

7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to DWIN M. CRAIG whose telephone number is (571)272-3710.

The examiner can normally be reached on 10:00 - 6:00 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Paul L. Rodriguez can be reached on (571) 272-3753. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR

Art Unit: 2123

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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